

US EPA's Natural Gas STAR: Directed Inspection and Maintenance (DI&M) Using Infrared Laser Detection

The US Environmental Protection Agency is promoting new technologies for methane leak screening and a directed inspection and maintenance program.

Section I: DI&M With Live Leak Imaging Cameras

The passive infrared camera provides a real time image and video recording of methane gas leaks that are invisible to the human eye. The camera operator can see, and points out, a leak that the survey operator is trying to find with an organic vapor analyzer probe. The leaking tube connector is readily apparent in the infrared camera image. Here the IR camera operator scanned hundreds of potential leak sources from a distance, spotting the high lighted flash leak. A piece of paper provides a background for the camera recording of the leaking gas. Leaks that are hard to reach with handheld sniffers are readily seen with the camera. This valve had been inspected for years using traditional methods and was never found to be leaking. The IR camera reveals that there is a pinhole leak in the valve bonnet rather than the packing stem, where leaks normally occur.

Here the camera is used to find leaks from underground distribution system mains. The IR camera can also be used as a safety device for maintenance workers as it detects gas in an underground regulator vault when the manhole cover is raised. Pipeline excavation and repair crews can use the camera to avoid human exposure to leaking gas. Traditionally, floating roof tank inspections are performed when the tank is still and the tank roof is at a high level so that hydrocarbons are dispersed by the wind. The IR camera can inspect a floating roof tank at any level from the access platform. Here the tank is about one-third full and the operator can spot gas leaks from the guide poles.

Section II: Aerial Leak Surveys With Passive Infrared Camera From Helicopter

The IR camera is also used from a helicopter to quickly survey for large leaks from remote facilities. The camera detects large leaks as far as three miles away and can record the image with GPS coordinates. Here the camera has picked up a large amount of casing head gas that is being vented from a stripper well. And this survey shows gas being vented from production stock tanks.

Section III: Infrared Laser Detection Devices

This section shows some other leak detection devices based on infrared light absorption by methane gas. This methane leak detection device uses an infrared laser beam to measure methane concentration along the beam path. Methane leaks can be detected from a distance of up to 100 feet from the source. This laser detection device can pinpoint a methane leak by scanning a beam

over the equipment. The green targeting laser is a visual aid to help the operator determine where he is aiming the invisible laser during the screening.

Up to 1000 miles per day of cross country pipelines can be surveyed for leaks with the Airborne Natural Gas Emission Lidar, or ANGEL system. This technology collects the reflected IR laser and GPS data while recording a digital image of the pipeline right of way. The data is superimposed to map locations and concentration of methane leaks. ANGEL services can also identify large methane leaks from individual tanks in production tank batteries.

The US EPA's Natural Gas STAR Program wishes to thank the companies who are helping our partners to reduce methane emissions with better technologies.